

REMARKS

The Office Action of October 16, 2009, has been carefully studied. Claims 11 and 14-21 currently appear in this application. These claims define novel and unobvious subject matter under Sections 102 and 103 of 35 U.S.C., and therefore should be allowed. Applicant respectfully requests favorable reconsideration, entry of the present amendment, and formal allowance of the claims.

Double Patenting

Claims 11 and 14-20 are rejected on the ground of nonstatutory obviousness-double patenting as being unpatentable over claim 6 of Watanabe et al., U.S. Patent No. 6,734,198 in view of Patani, *Chem. Rev.*, 1996, 3147-3176.

This rejection is respectfully traversed. Claim 6 of Watanabe (US) is directed to a process for oxidizing a sulfide to a sulfoxide or a sulfone by reacting the sulfide with an oxidizing agent, optionally in the presence of an inert solvent. Patani merely discusses the steric properties of substituting hydrogen by fluorine. There is nothing in claim 6 that of Watanabe (US) that suggests using a particular oxidizing agent or conducting the reaction at a particular pH. One skilled in the art reading Watanabe (US) in combination

with Patani would have no reason to conduct the reaction with a salt of peroxomonosulfuric acid or to conduct the oxidation of the sulfoxide to the sulfone at a pH of from 6 to 10.

The declaration of Dr. Shlomo COHEN submitted July 11, 2008, as well as the declaration of Dr. Shlomo Cohen submitted herewith, clearly demonstrate that it is critical in oxidizing the sulfoxide to a sulfone that the pH of the reaction be above 6, and preferably from 8 to 9. If the pH is below 6, the reaction will not proceed to completion. This is nowhere even suggested by the combination of Watanabe (US) and Patani.

Claim Objections

Claims 11 and 14-20 are objected to for containing elected and non-elected subject matter.

It is respectfully requested that the election requirement should be withdrawn. The claimed invention is directed to a process for oxidizing sulfides to sulfoxides and to sulfones. The reaction can proceed with a great variety of heterocyclic substituents. The type of heterocycle in the compound oxidized is not critical. It is the reaction *per se* that is claimed, not a particular heterocyclic compound, as the reaction is suitable for a variety of heterocyclic substituents. Accordingly, it is respectfully submitted that

there is no reason to restrict the claimed process to a subset of compounds encompassed by the present claims.

Art Rejections

Claims 11 and 14-20 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Watanabe et al., WO 01/02378, hereinafter Watanabe WO, in view of Patani. The Examiner contends that Watanabe WO clearly points to potassium monopersulfate as an alternative to hydrogen peroxide, that the group of oxidizing agents listed by Watanabe WO is not large, that peroxosulfuric acid is specifically named, and therefore is adequately suggested.

The Examiner further contends that Watanabe WO raises the pH to 6 only in the reaction from sulfide to sulfone. The Examiner alleges that, as this step is not mentioned in Example 2 that shows the reaction of sulfide to sulfoxide, one of ordinary skill in the art would understand that the raising of the pH would carry the reaction to completion and that Watanabe WO teaches the pH provision in claim 11.

The Examiner has cited Patani to more fully address the claim to cover the case in which R<sup>1</sup> is fluorine or hydrogen.

This rejection is respectfully traversed.

It is respectfully submitted that one skilled in the art would not have been motivated to conduct the reaction as claimed herein, i.e., at pH of 6-10 based upon the teachings of Watanabe WO and in view of knowledge in the field, in order to achieve the desired results.

The Examiner's attention is drawn to the fact that the pH in Example 3 of Watanabe WO is raised to 6 only at the work-up step, that is, isolation, purification, etc., which occurs after completion of the reaction, in order to neutralize the excess of hydrogen peroxide. It should be noted that the pH is not raised to 6 during the reaction step (in the reaction of sulfide to sulfone, as asserted by the Examiner). The reaction step in Watanabe WO in Example 3 is completed when 31% hydrogen peroxide water (3.29 g) is added and stirred at 55-60°C for six hours.

Further, when conducting the reaction with hydrogen peroxide, as described in Watanabe WO, one skilled in the art would not have raised the pH to 6 during the reaction step, because at this pH hydrogen peroxide would decompose. That is the reason the pH is raised in Watanabe WO after the reaction has occurred. Moreover, the acetic acid which is used in the reaction would be converted to an acetate salt, as the pH is raised, and consequently, the reaction would be inoperable.

It is clear from the above that Watanabe WO teaches conducting the reaction at an acidic pH, and one skilled in the art would have no motivation to raise the pH to 6 and above. In fact, to avoid decomposing the hydrogen peroxide oxidizing agent, one skilled in the art would be careful not to raise the pH to 6 and above. Accordingly, there is no teaching or suggestion to conduct the reaction in the herein claimed pH range.

It is known that peroxomonosulfate (OXONE®) stability is adversely affected by higher pH, especially above 7. The art teaches that a point of minimum stability exists at about pH 9, at which the concentration of the mono-anion  $\text{HSO}_5^-$  is equal to that of the di-anion  $\text{SO}_5^{2-}$ .

Submitted herewith in an IDS are copies of the following:

DuPont Oxone, Technical Information, see page 4, lines 2-5;

Betterton, *Environ. Sci. Technol.*, 1990, **24**:1819-1824, see page 1819, first paragraph; and

Kennedy et al., *J. Org. Chem.*, 1960, **25**:1901-1006, particularly page 1902, first column, third paragraph.

From the above, it is clear that one skilled in the art would have been taught away from using a salt of peroxomonosulfuric acid at a pH of from 6-10 as claimed herein in order to achieve the desired results. Both the prior art and knowledge in the field would have discouraged a skilled person from conducting the reaction as claimed herein.

Patani adds nothing to Watanabe WO, as Patani merely relates to the steric properties of substituting hydrogen for fluorine. This disclosure relates to the pharmaceutical activities of compounds with either hydrogen or fluorine substituents, which has nothing to do with oxidation of sulfides.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.  
Attorneys for Applicant

By:



Anne M. Kornbau  
Registration No. 25,884

AMK:srd  
Telephone No.: (202) 628-5197  
Facsimile No.: (202) 737-3528  
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